



TE	EST REPORT				
Report Reference No: Project No: FCC ID	CHTEW19060131 SHT1901065806EW 2ASRT-SCN450	Report verification:			
Applicant's name:	Screeneo Innovation SA	"Reportion CHTONIBOOLD.""			
Address	Route de Lully 5C, 1131 Toloci	henaz, Switzerland			
Manufacturer	SHENZHEN HOLATEK CO. L				
Test item description:	Home Projector				
Trade Mark	Philips				
Model/Type reference:	Screeneo S4				
Listed Model(s)					
Standard:	FCC CFR Title 47 Part 15 Sub	opart C Section 15.247			
Date of receipt of test sample	Mar 30,2019				
Date of testing	Mar 31,2019- Jun 19,2019				
Date of issue:	Jun 20,2019				
Result:	PASS				
Compiled by (Position+Printed name+Signature):	File administrators Silvia Li	Silvia Li			
Supervised by (Position+Printed name+Signature):	Project Engineer Aaron Fang	Aaron.Fang Homsty			
Approved by (Position+Printed name+Signature):	RF Manager Hans Hu	Homsty			
Testing Laboratory Name:	Shenzhen Huatongwei Intern	ational Inspection Co., Ltd.			
Address 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China					
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The test report merely correspond to the test sample.

Contents

<u>1.</u>	TEST STANDARDS AND REPORT VERSION	3
1.1.	Test Standards	3
1.2.	Report version	3
<u>2.</u>	TEST DESCRIPTION	4
<u>3.</u>	SUMMARY	5
3.1.	Client Information	5
3.2.	Product Description	5
3.3.	Operation state	6
3.4.	EUT configuration	6
3.5.	Modifications	6
<u>4.</u>	TEST ENVIRONMENT	7
4.1.	Address of the test laboratory	7
4.2.	Test Facility	7
4.3.	Environmental conditions	8
4.4.	Statement of the measurement uncertainty	8
4.5.	Equipments Used during the Test	9
<u>5.</u>	TEST CONDITIONS AND RESULTS	11
5.1.	Antenna requirement	11
5.2.	Conducted Emissions (AC Main)	12
5.3.	Conducted Peak Output Power	15
5.4.	20 dB Bandwidth	19
5.5.	Carrier Frequencies Separation	23
5.6.	Hopping Channel Number	25
5.7.	Dwell Time	27
5.8.	Pseudorandom Frequency Hopping Sequence	34
5.9.	Restricted band (radiated)	35
5.10. 5.11.	Band edge and Spurious Emissions (conducted) Spurious Emissions (radiated)	37 53
<u>6.</u>	TEST SETUP PHOTOS	57
7	EXTERANAL AND INTERNAL PHOTOS	58

1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

<u>FCC Rules Part 15.247:</u> Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devicese

1.2. Report version

Revision No.	Date of issue	Description		
N/A	2019-06-20	Original		

2. TEST DESCRIPTION

Test Item	Section in CFR 47	Result	Test Engineer
Antenna Requirement	15.203/15.247 (c)	PASS	Jiongsheng Feng
AC Power Line Conducted Emissions	15.207	PASS	Jiongsheng Feng
Conducted Peak Output Power	15.247 (b)(1)	PASS	Bruse.Li
20 dB Bandwidth	15.247 (a)(1)	PASS	Bruse.Li
Carrier Frequencies Separation	15.247 (a)(1)	PASS	Bruse.Li
Hopping Channel Number	15.247 (a)(1)	PASS	Bruse.Li
Dwell Time	15.247 (a)(1)	PASS	Bruse.Li
Pseudorandom Frequency Hopping Sequence	15.247(b)(4)	PASS	Bruse.Li
Restricted band	15.247(d)/15.205	PASS	Bruse.Li
Radiated Emissions	15.247(d)/15.209	PASS	Bruse.Li

Note: The measurement uncertainty is not included in the test result.

3. <u>SUMMARY</u>

3.1. Client Information

Applicant:	Screeneo Innovation SA	
Address: Route de Lully 5C, 1131 Tolochenaz, Switzerland		
Manufacturer: SHENZHEN HOLATEK CO. LTD.		
Address:	1001,10F,Building B4,KeXing Science Park,Nanshan, Shenzhen,China.	

3.2. Product Description

Name of EUT:	Home Projector	
Trade Mark:	Philips	
Model No.:	Screeneo S4	
Listed Model(s):	-	
Power supply:	DC 19.0V	
Adapter information:	Model:GQ150-1900780-E1 Input:100-240Va.c., 50/60Hz, 2.0A Max Output:19Vd.c., 7.8A	
Hardware version:	VER D	
Software version:	1.0.20	
Bluetooth		
Version:	Supported BT4.0+EDR	
Modulation:	GFSK, π/4DQPSK, 8DPSK	
Operation frequency:	2402MHz~2480MHz	
Channel number:	79	
Channel separation:	1MHz	
Antenna type:	FPC Antenna	
Antenna gain:	1.19dBi	

3.3. Operation state

Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above gray bottom.

Channel	Frequency (MHz)
00	2402
01	2403
:	:
39	2441
:	:
77	2479
78	2480

> TEST MODE

For RF test items:

The engineering test program was provided and enabled to make EUT continuous transmit

For AC power line conducted emissions:

The EUT was set to connect with the Bluetooth instrument under large package sizes transmission.

For Radiated suprious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data recorded in the report.

3.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- supplied by the manufacturer
- supplied by the lab

/	1	Manufacturer:	/
	,	Model No.:	/
1	1	Manufacturer:	/
	7	Model No.:	/

3.5. Modifications

No modifications were implemented to meet testing criteria.

4. TEST ENVIRONMENT

4.1. Address of the test laboratory

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd. Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

4.2. Test Facility

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 3902.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 762235

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files.

IC-Registration No.:5377B-1

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No.: 5377B-1.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

4.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

4.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors in calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd. quality system according to ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Here after the best measurement capability for Shenzhen Huatongwei International Inspection Co., Ltd. is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.63 dB	(1)
Conducted spurious emissions 9kHz~40GHz	0.63 dB	(1)
Conducted Disturbance 150kHz~30MHz	3.35 dB	(1)
Radiated Emissions below 1GHz	4.28 dB	(1)
Radiated Emissions above 1GHz	5.16 dB	(1)
Occupied Bandwidth	69 Hz	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96

4.5. Equipments Used during the Test

•	Conducted Emission					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
•	Shielded Room	Albatross projects	N/A	N/A	2018/09/28	2023/09/27
•	EMI Test Receiver	R&S	ESCI	101247	2018/10/27	2019/10/26
•	Artificial Mains	SCHWARZBECK	NNLK 8121	573	2018/10/27	2019/10/26
•	Pulse Limiter	R&S	ESH3-Z2	100499	2018/10/27	2019/10/26
•	RF Connection Cable	HUBER+SUHNER	EF400	N/A	2018/11/15	2019/11/14
•	Test Software	R&S	ES-K1	N/A	N/A	N/A
0	Single Balanced Telecom Pair ISN	FCC	FCC-TLISN-T2-02	20371	2018/10/28	2019/10/27
0	Two Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T4-02	20373	2018/10/28	2019/10/27
0	Four Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T8-02	20375	2018/10/28	2019/10/27
0	V-Network	R&S	ESH3-Z6	100211	2018/10/27	2019/10/26
0	V-Network	R&S	ESH3-Z6	100210	2018/10/27	2019/10/26
0	2-Line V-Network	R&S	ESH3-Z5	100049	2018/10/27	2019/10/26

•	Radiated Emission-6th test site					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
•	Semi-Anechoic Chamber	Albatross projects	SAC-3m-02	N/A	2018/09/30	2021/09/29
•	EMI Test Receiver	R&S	ESCI	100900	2018/10/28	2019/10/27
•	Loop Antenna	R&S	HFH2-Z2	100020	2017/11/20	2020/11/19
•	Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	546	2017/04/05	2020/04/04
•	Pre-Amplifer	SCHWARZBECK	BBV 9742	N/A	2018/11/15	2019/11/14
•	RF Connection Cable	HUBER+SUHNER	N/A	N/A	2018/09/28	2019/09/27
•	RF Connection Cable	HUBER+SUHNER	SUCOFLEX104	501184/4	2018/09/28	2019/09/27
•	Test Software	R&S	ES-K1	N/A	N/A	N/A
•	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
•	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

•	Radiated emission-7th test site								
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)			
•	Semi-Anechoic Chamber	Albatross projects	SAC-3m-01	N/A	2018/09/30	2021/09/29			
•	Spectrum Analyzer	R&S	FSP40	100597	2018/10/27	2019/10/26			
•	Horn Antenna	SCHWARZBECK	9120D	1011	2017/03/27	2020/03/26			
•	Pre-amplifier	BONN	BLWA0160-2M	1811887	2018/11/14	2019/11/13			
•	Pre-amplifier	CD	PAP-0102	12004	2018/11/14	2019/11/13			
•	Broadband Pre- amplifier	SCHWARZBECK	BBV 9718	9718-248	2019/04/28	2020/04/27			
•	RF Connection Cable	HUBER+SUHNER	RE-7-FH	N/A	2018/11/15	2019/11/14			
•	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	2018/11/15	2019/11/14			
•	Test Software	Audix	E3	N/A	N/A	N/A			

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Page: 10 of 58

Issued: 2019-06-20

٠	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
•	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

•	RF Conducted Method									
Used	d Test Equipment Manufacturer		Model No. Serial No.		Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)				
•	Signal and spectrum Analyzer	R&S	FSV40	100048	2018/10/28	2019/10/27				
•	Spectrum Analyzer	Agilent	N9020A	MY50510187	2018/09/29	2019/09/28				
0	Radio communication tester	R&S	CMW500	137688-Lv	2018/09/29	2019/09/28				
0	Test software	Tonscend	JS1120-1(LTE)	N/A	N/A	N/A				
0	Test software	Tonscend	JS1120-2(WIFI)	N/A	N/A	N/A				
0	Test software	Tonscend	JS1120-3(WCDMA)	N/A	N/A	N/A				
0	Test software	Tonscend	JS1120-4(GSM)	N/A	N/A	N/A				

5. TEST CONDITIONS AND RESULTS

5.1. Antenna requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of anantenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Test Result:

☑ Passed □ Not Applicable

The directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



5.2. Conducted Emissions (AC Main)

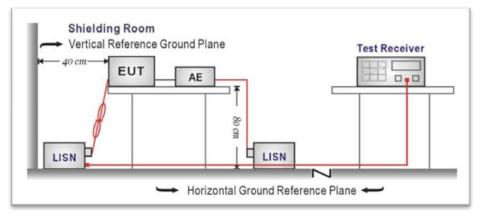
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

	Limit (dBuV)			
Frequency range (MHz)	Quasi-peak	Average		
0.15-0.5	66 to 56*	56 to 46*		
0.5-5	56	46		
5-30	60	50		

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

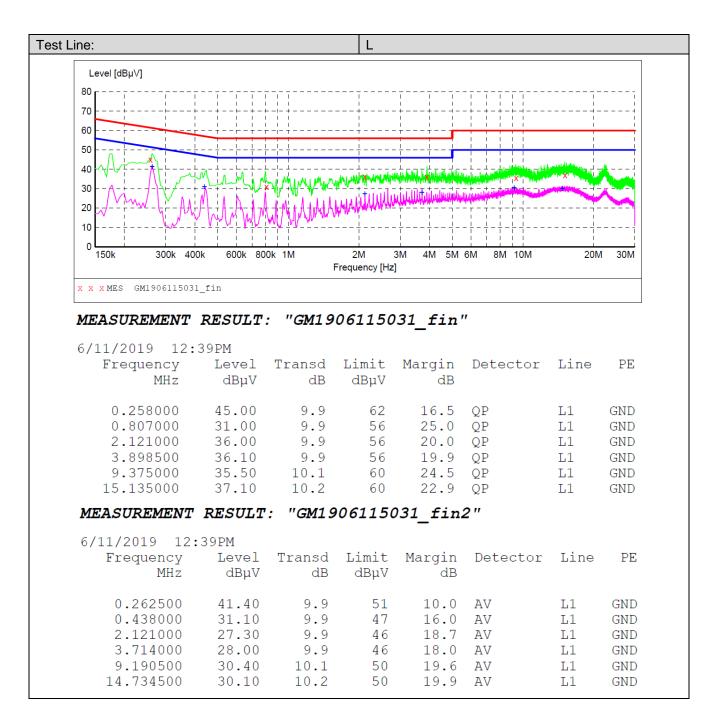
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
- 3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
- 4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
- 5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
- 6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
- 7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
- 8. During the above scans, the emissions were maximized by cable manipulation.

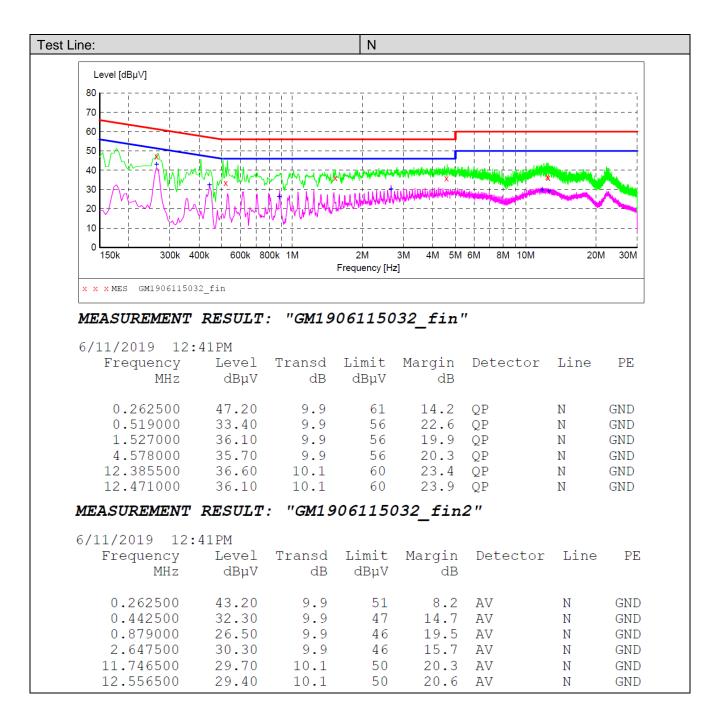
TEST RESULTS

☑ Passed □ Not Applicable

Note:

- 1) Transd= Cable lose + Pulse Limiter Factor + Artificial Mains Factor
- 2) Margin= Limit Level



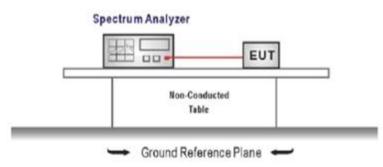


5.3. Conducted Peak Output Power

<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 nonoverlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the pathloss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel RBW≥ the 20 dB bandwidth of the emission being measured, VBW≥RBW Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

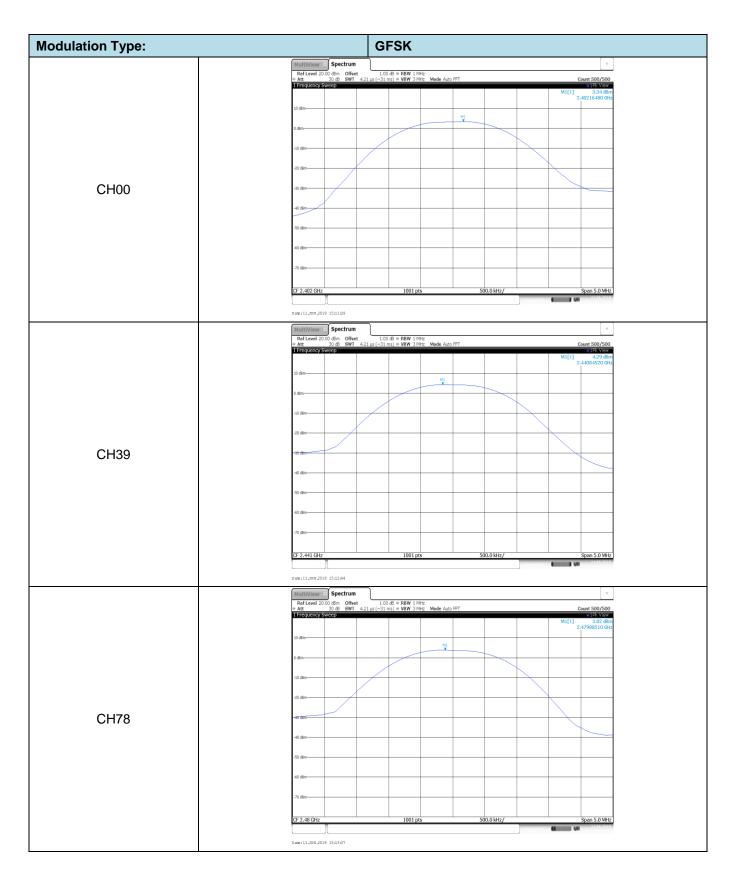
TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

Modulation type	Channel	Output power (dBm)	Limit (dBm)	Result	
	00	3.34			
GFSK	39	4.29	≤ 30.00	Pass	
	78	3.82			
	00	4.15			
π/4DQPSK	39	5.33	≤ 21.00	Pass	
	78	5.13			
	00	4.38			
8DPSK	39	4.28	≤ 21.00	Pass	
	78	3.93			



odulation Type:	π/4	DQPSK		
	MultiView :: Spectrum	16 Ju		V
	Ref Level 20.00 dBm Offset 1.00 dB # Att 30 dB SWT 1.01 ms # VBW 5 I Frequency Sweep	MHz Mode Auto Sweep		Count 500/500 • 1Pk View
			M1[1]	4.15 dBm 2.40212990 GHz
	10 dam	Mji		
	0 dism			
	10 cBm			
	-20 dBm			
CH00	-30 dBm			
erioo				
	+60 dBm			
	-50 dBm			
	-60 dBm			
	-70 dBm			
	CF 2,402 GHz	1001 pts 500	0 kHz/	Span 5.0 MHz
			Meanwine (11111) A	
	Dam:11JUN 2019 15:15:32			
	MultiView Spectrum Ref Level 20.00 dbm Offset 1.00 db RBW 2 Att 30 db SWT 1.01 ms VBW 3	MHz		v
	= Att 30.68 SWT 1.01 ms = VBW 3 1 Frequency Sweep	MHZ Mode Auto Sweep		Count 500/500 1Fk View 5.33 dBm 2.44086510 GHz
	10 dBm			2.44086510 GHz
	0 dām	M1		
	-10 dBm			
	-20 dBm			
CH39	-30 dBm			
	-40 dBm			
	-50 dBm			
	-60 dBm			
	-70 d8m			
	CF 2.441 GHz	1001 pts 500	0 kHz/	Span 5.0 MHz
	Date:11.JUN 2019 15:16%0		Mesoning (Internet 4	X
	MultiView # Spectrum			V
	Ref Level 20.00 dBm Offset 1.00 dB = RBW 2 ■ Att 30 dB SWI 1.01 ms = VBW 5	MHz Mode Auto Sweep		Count 500/500
	1 Frequency Sweep		M1[1]	 1Fk View 5.13 dBm 2.47984020 GHz
	10 d8m	M1		
	0 dism			
	-10 dem			
	-20 dbm			
CH78	-30 dBm			
	-40 dbm			
	-50 dBm			
	-60 dBm			
	-70 dBm			
	CF 2,48 GHz	1001 pts 500	0 kHz/	Span 5.0 MHz

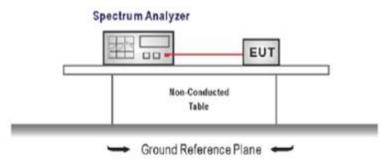
odulation Type:		8DPSK		
	MultiView 🗄 Spectrum			
	RefLevel 20.00 dBm Offset 1.00 e Att 30 dB SWT 1.01	dB = RBW 2 MHz ms = VBW 5 MHz Mode Auto Sweep		Count 500/500
	1 Frequency Sweep			• 19k Wew M1[1] 4.38 dBm 2.40203000 GHz
	10 dBm			
	0 dām	Ÿ		
	-18 dbm			
	-20 dBm-			
CH00	-30 dBm			
01100				
	-40 dBm			
	-50 dBm			
	-60 dBm			
	-70 d8m			
	CF 2.402 GHz	1001 pts	500.0 kHz/	Span 5.0 MHz
	Date:11.JUN.2019 15:18:26		Measuring	(1106.2010 (1106.2010)
				[_]
	MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 # Att 30 dB SWT 1.01	dB = RBW 2 MHz		Count 500/500
	1 Frequency Sweep	IIS - YOW SHITZ MOUCHUO SHEEP		• 1Pk View M1[1] 4.28 dBm
	10 dBm			2.44098500 GHz
		М		
	0 dām-			
	18 Bm			
	-20 d8m			
01100				
CH39	-30 dBm			
	-40 dBm-			
	-50 d8m			
	-60 dBm			
	-60 dem-			
	-70 d8m			
	CF 2.441 GHz	1001 pts	500.0 kHz/	Span 5.0 MHz
			Measuring	(11052010) (11052010)
	Date:11.JUN.2019 15:19:00			· · · ·
	MultiView Spectrum Ref Level 20.00 dBm Offset 1.00	dB @ RBW 2 MHz		Ψ
	RefLevel 20.00 dBm Offset 1.00 Att 30 dB SWT 1.01 I Frequency Sweep	ms = VBW 5 MHz Mode Auto Sweep	1	Count 500/500 10k View
				M1[1] 3.93 dBm 2.47998500 GHz
	10 dBm	м		
	0 dām			
	-16 d8m			
	. 20 d ⁰			
	-20 d8m			
CH78	-30 dBm			
	-40 dBm			
	-50 dBm			
	new soliti			
	-60 d8m			
	-59 08m-			
	-70 dbm			
	-70 d8m			
		1001 pts	500.0 kHz/	Span 5.0 MHz

5.4. 20 dB Bandwidth

<u>LIMIT</u>

N/A

TEST CONFIGURATION



TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- 3. Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel RBW \ge 1% of the 20 dB bandwidth, VBW \ge RBW

Sweep = auto, Detector function = peak, Trace = max hold

4. Measure and record the results in the test report.

TEST MODE:

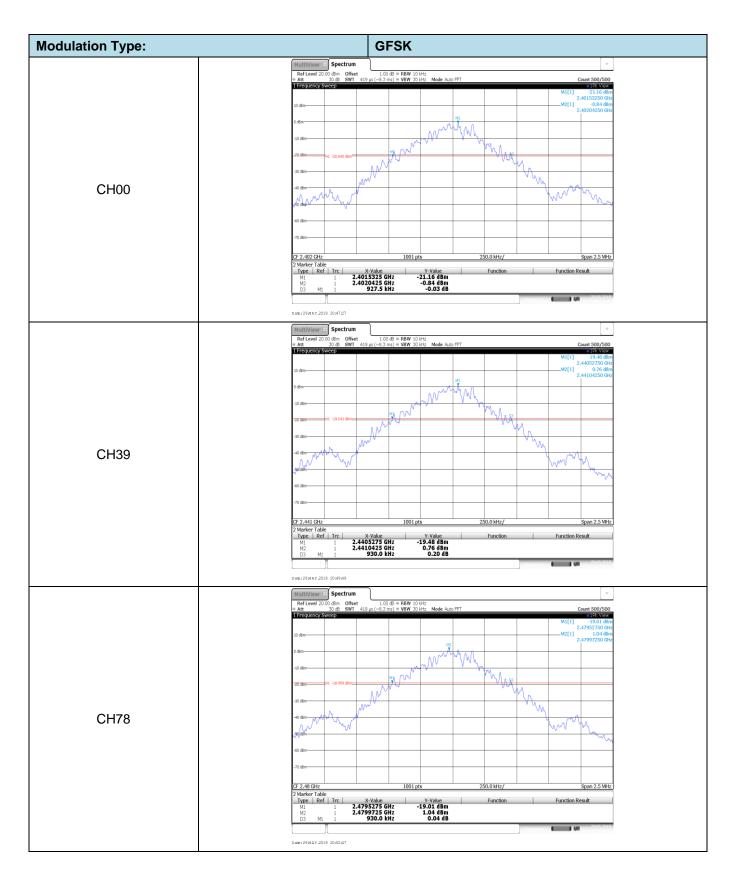
Please refer to the clause 3.3

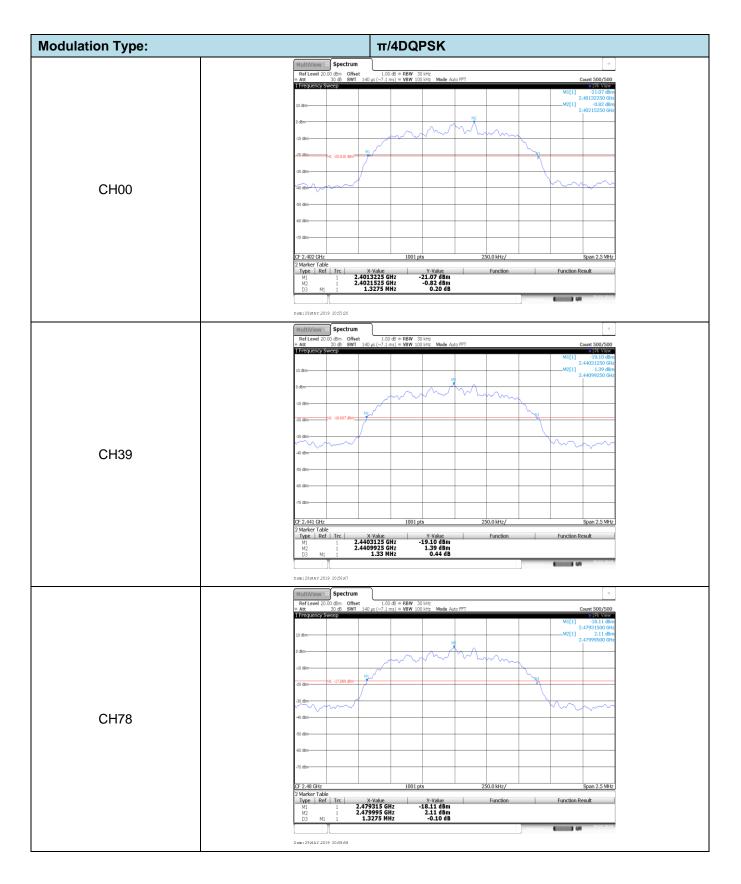
TEST RESULTS

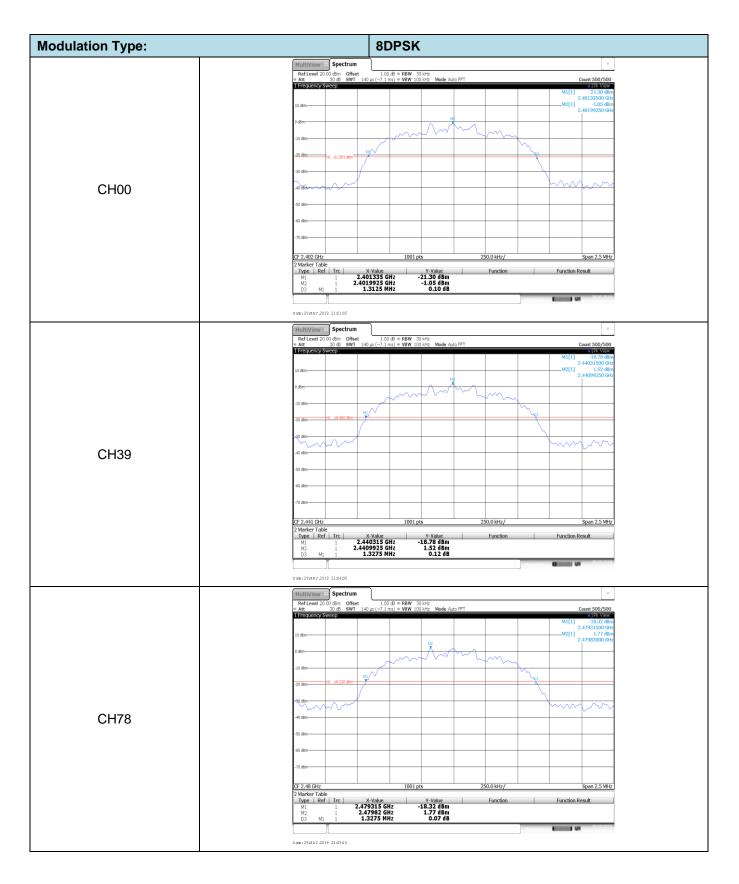
🛛 Passed

Not Applicable

Modulation type	Channel	20 dB Bandwidth (MHz)	Limit (MHz)	Result
	00	0.93		
GFSK	39	0.93	-	Pass
	78	0.93		
	00	1.33		
π/4DQPSK	39	1.33	-	Pass
	78	1.33		
	00	1.31		
8DPSK	39	1.33	-	Pass
	78	1.33		







5.5. Carrier Frequencies Separation

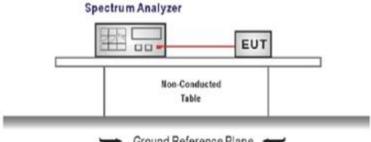
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively,

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST CONFIGURATION



Ground Reference Plane

TEST PROCEDURE

- The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was 1. compensated to the results for each measurement.
- Set to the maximum power setting and enable the EUT transmit continuously 2.
- 3. Use the following spectrum analyzer settings: Span = wide enough to capture the peaks of two adjacent channels RBW \geq 1% of the span, VBW \geq RBW Sweep = auto, Detector function = peak, Trace = max hold
- Measure and record the results in the test report. 4.

TEST MODE:

Please refer to the clause 3.3

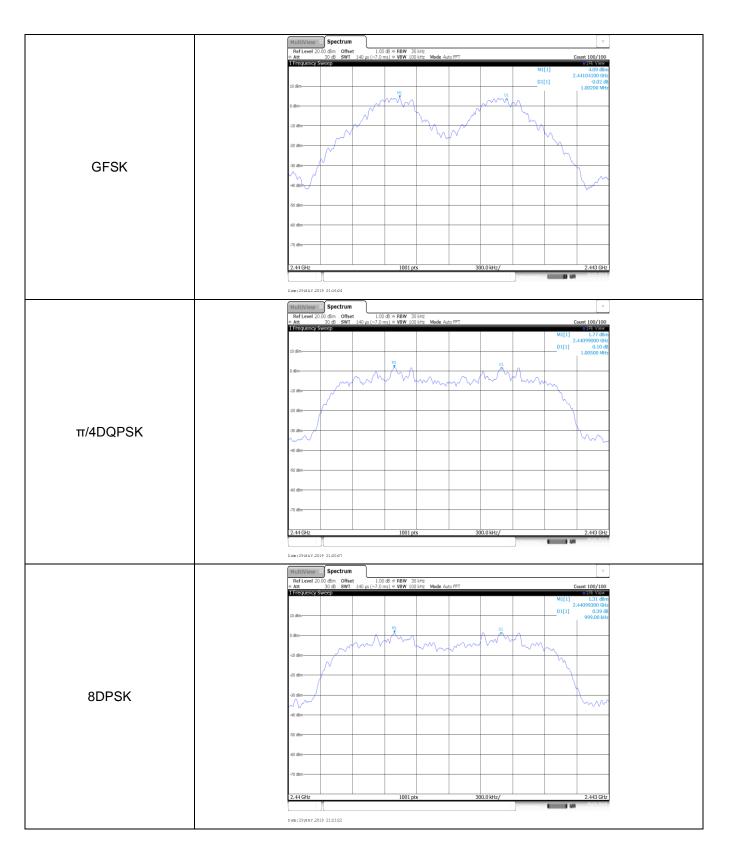
TEST RESULTS

Passed Not Applicable

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (MHz) *	Result
GFSK	39	1.00	≥	Pass
π/4DQPSK	39	1.00	≥	Pass
8DPSK	39	1.00	≥	Pass

Note:

*: GFSK limit = The maximum 20 dB Bandwidth for GFSK modulation on the section 5.4. π /4DQPSK limit = 2/3 * The maximum 20 dB Bandwidth for π /4DQPSK modulation on the section 5.4. 8DPSK limit = 2/3 * The maximum 20 dB Bandwidth for 8DPSK modulation on the section 5.4

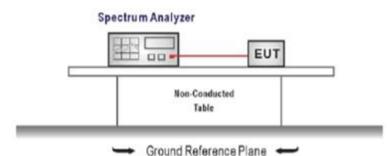


5.6. Hopping Channel Number

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):Frequency hopping systems in the 2400–2483.5 MHz band shall use at least **15** channels.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = the frequency band of operation RBW ≥ 1% of the span, VBW ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

Modulation type	Channel number	Limit	Result
GFSK	79		
π/4DQPSK	79	≥15.00	Pass
8DPSK	79		

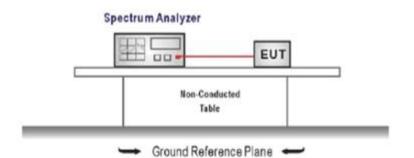
	v Spectrum
	ef Level 20.00 dBm Offset 1.00 dB = RBW 100 kHz tt 30 dB SWT 1.02 ms = VBW 300 kHz Mode Auto Sweep
	* 19k Wew
	<u>andariya danakan bataan badadii adii dadan tabiran 115 janda barkee dabahan badan bara bara bara bara bara bara</u>
	Contraction of the second s
	8m-
GFSK	80-
Gron	
	80
	80
	80-
	80-
	GHz 1001 pts 8.35 MHz/ 2.4835 GHz
	29MAY 2019 214736
	ItiView 🗄 Spectrum
	eflevel 20.00 d8m Offset 1.00 d8 = RBW 1001Hz tt 30 d8 SWT 1.02 ms = VBW 3001Hz Mode Auto Sweep equercySweep 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	m
	hour for the second of the sec
	8n
π/4DQPSK	80-
	8n
	80
	8n
	8n
	GHz 1001 pts 8.35 MHz/ 2.4835 GHz
	Versedes (1111) 🖗 2055017
	229xar2019 212133
	efLevel 20.00 dBm Offset 1.00 dB = RBW 100 kHz tt 30 dB SWT 1.02 ms = VBW 300 kHz Mode Auto Sweep
	equency Sweep #19k View
	ware for the for the for the state of the st
	80-
8DPSK	8n-
ODI OIX	5n
	80-
	80-
	85
	GHz 1001 pts 8.35 MHz/ 2.4835 GHz

5.7. Dwell Time

<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):The average time of occupancy on any channel shall not be greater than 0.4 seconds within a pe-riod of 0.4 seconds multiplied by the number of hopping channels employed.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel, RBW= 1 MHz, VBW ≥ RBW Sweep = as necessary to capture the entire dwell time per hopping channel, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

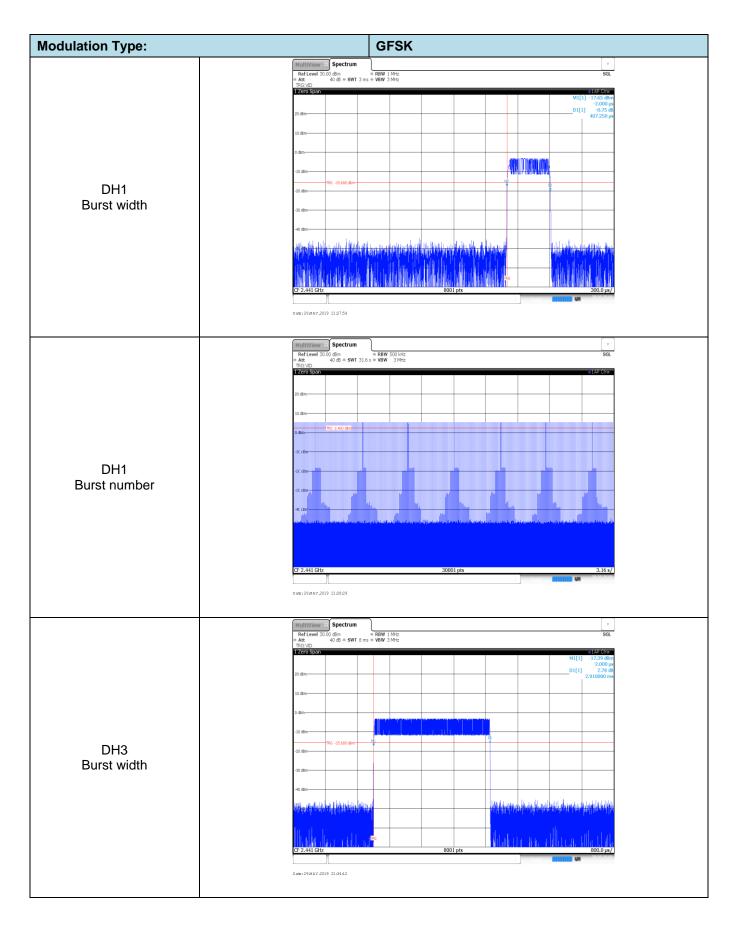
TEST MODE:

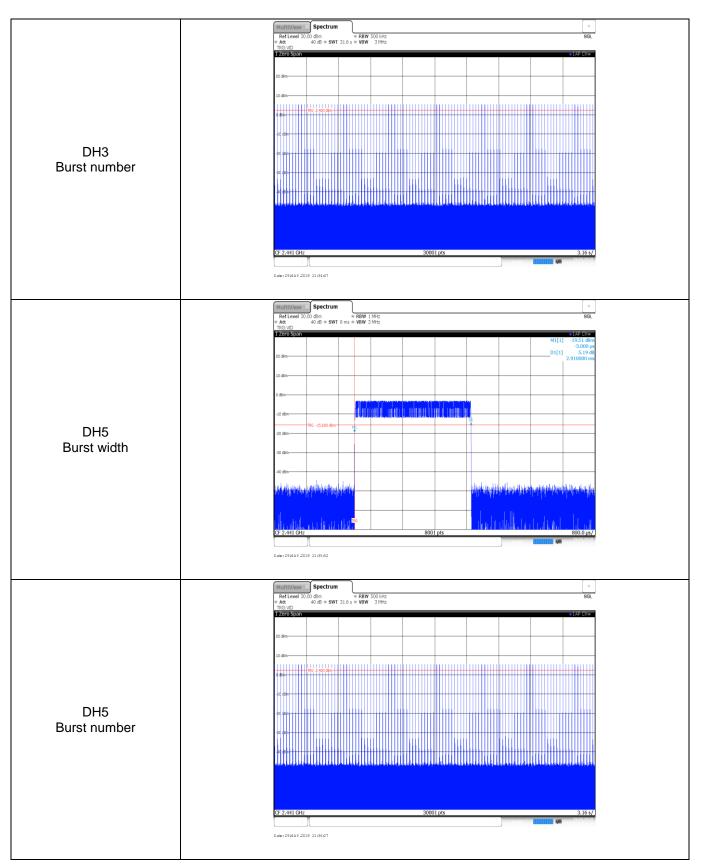
Please refer to the clause 3.3

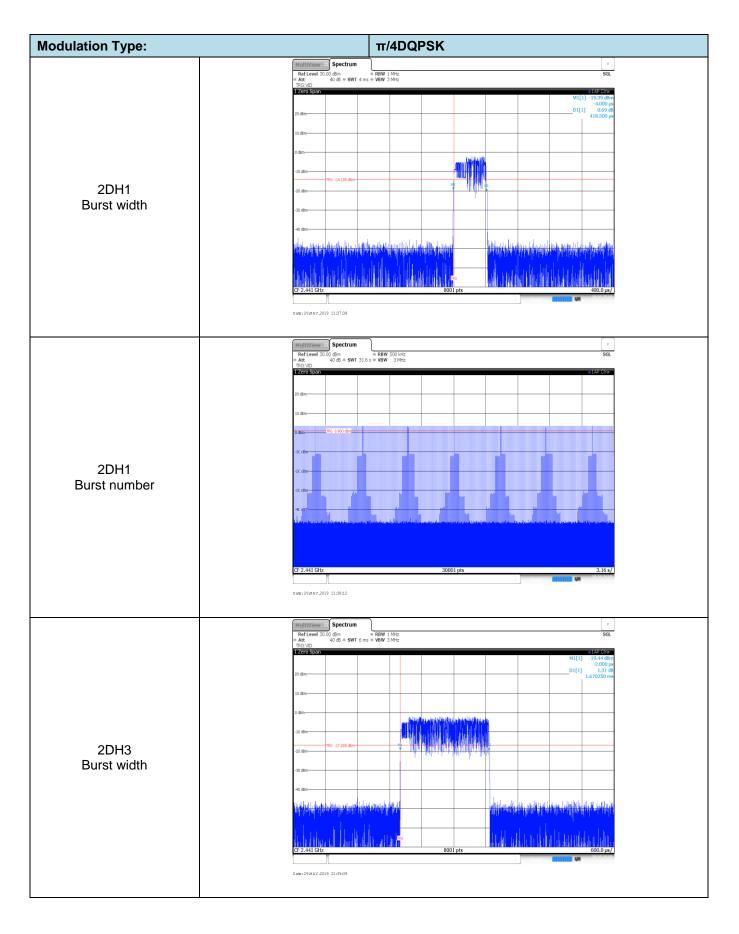
TEST RESULTS

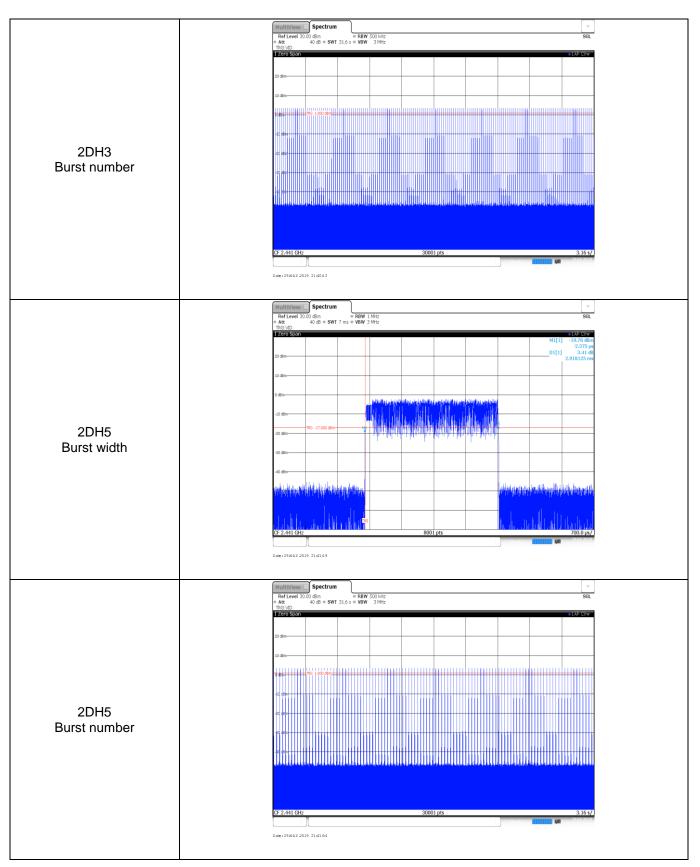
☑ Passed □ Not Applicable

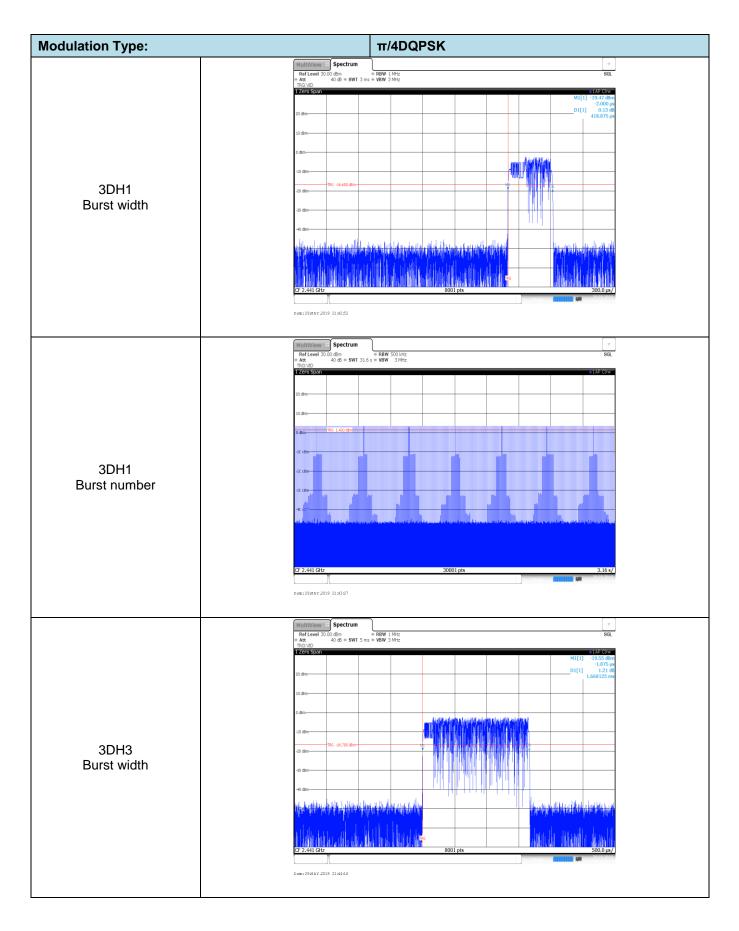
Modulation type	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
	DH1	0.41	320.00	0.13		
GFSK	DH3	2.91	107.00	0.31	≤ 0.40	Pass
	DH5	2.91	107.00	0.31		
	2DH1	0.42	320.00	0.13		
π/4DQPSK	2DH3	1.67	160.00	0.27	≤ 0.40	Pass
	2DH5	2.92	107.00	0.31		
	3DH1	0.42	320.00	0.13		
8DPSK	3DH3	1.67	160.00	0.27	≤ 0.40	Pass
	3DH5	2.92	107.00	0.31		

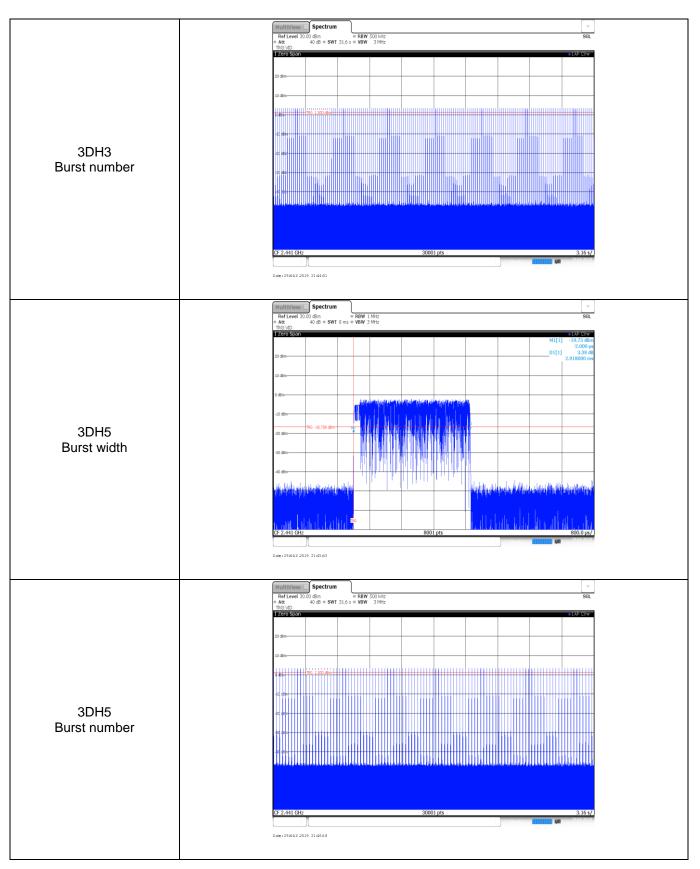












5.8. Pseudorandom Frequency Hopping Sequence

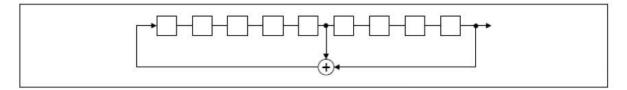
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):Frequency hopping systems shall have hopping channel carrier fre-quencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Al-ternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier fre-quencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to chan-nel frequencies that are selected at the system hopping rate from a pseudo ran-domly ordered list of hopping fre-quencies. Each frequency must be used equally on the average by each trans-mitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their cor-responding transmitters and shall shift frequencies in synchronization with the transmitted signals.

TEST RESULTS

The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the friststage. The sequence begins with the frist one of 9 consecutive ones, for example: the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:29-1=511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:

5 7	73 7		1	78	64	62	1	ł	4	2	0
Т		 		1			 Τ	Т	Г		Т
				1		1		Т			
				1							

Each frequency used equally one the average by each transmitter.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

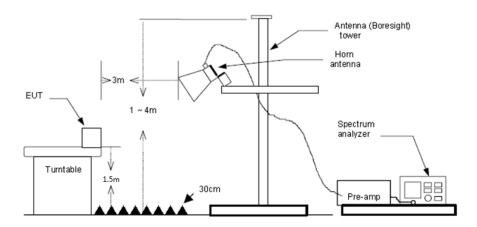
5.9. Restricted band (radiated)

<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

TEST CONFIGURATION



TEST PROCEDURE

- 1. The EUT was setup and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
- 2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
- 4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
- The receiver set as follow: RBW=1 MHz, VBW=3 MHz Peak detector for Peak value RBW=1 MHz, VBW=10 Hz Peak detector for Average value.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

Note:

- 1) Final level= Read level + Antenna Factor+ Cable Loss- Preamp Factor
- Have pre-scan all modulation mode, found the GFSK modulation which it was worst case, so only the worst case's data on the test report.
- 3) The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.

Test channe	el:				СН00					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
2310.00	34.97	28.05	7.73	38.17	32.58	74.00	-41.42	Horizontal	Peak	
2390.00	33.75	27.65	7.84	37.97	31.27	74.00	-42.73	Horizontal	Peak	
2310.00	35.09	28.05	7.73	38.17	32.70	74.00	-41.30	Vertical	Peak	
2390.00	34.93	27.65	7.84	37.97	32.45	74.00	-41.55	Vertical	Peak	
2310.00	22.38	28.05	7.73	38.17	19.99	54.00	-34.01	Horizontal	Average	
2390.00	22.04	27.65	7.84	37.97	19.56	54.00	-34.44	Horizontal	Average	
2310.00	23.42	28.05	7.73	38.17	21.03	54.00	-32.97	Vertical	Average	
2390.00	22.37	27.65	7.84	37.97	19.89	54.00	-34.11	Vertical	Average	

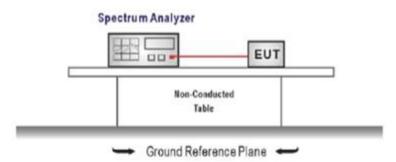
Test chann	el:				CH78					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
2483.50	52.56	27.26	8.04	37.59	50.27	74.00	-23.73	Horizontal	Peak	
2500.00	34.25	27.20	8.08	37.38	32.15	74.00	-41.85	Horizontal	Peak	
2483.50	51.06	27.26	8.04	37.59	48.77	74.00	-25.23	Vertical	Peak	
2500.00	34.75	27.20	8.08	37.38	32.65	74.00	-41.35	Vertical	Peak	
2483.50	30.24	27.26	8.04	37.59	27.95	54.00	-26.05	Horizontal	Average	
2500.00	21.66	27.20	8.08	37.38	19.56	54.00	-34.44	Horizontal	Average	
2483.50	29.17	27.26	8.04	37.59	26.88	54.00	-27.12	Vertical	Average	
2500.00	21.74	27.20	8.08	37.38	19.64	54.00	-34.36	Vertical	Average	

5.10. Band edge and Spurious Emissions (conducted)

<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: RBW = 100 kHz, VBW ≥ RBW, scan up through 10th harmonic. Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

Fest Item:	Band edge		Modulatio	on type:		GFSK	(
		MultiView Spectrum Ref evel 20.00 dBm Offset 1					Ψ.	
		Ref Level 20.00 dBm Offset 1. Att 30 dB SWT 1.0 1 Frequency Sweep	5 ms ⊕ VBW 300 kHz Mode Au	to Sweep			Count 500/500 10k Max	
		10 dBm				M1[1] M2[1]	5.30 dBm 2.4021050 GHz -40.07,dBm	
		0 dBm					2.4000000 GHz	
		-10 dBm-						
		-20 dBm						
		-30 d8m						
CH00		-40 dBm-					15/10	
No hopping mode		-50 dBm					1	
		-60 dBm	monument	ahunna marina	and warm	munkeran	w MM	
		-70 dBm-						
		2.31 GHz 2 Marker Table	1001 pts		MHz/		2.405 GHz	
		Type Ref Trc M1 1 2.40 M2 1	X-Value Y-Va 2105 GHz 5.30 2.4 GHz -40.07) dBm / dBm	Function	Function R	Result	
		M3 1 M4 1	2.39 GHz -63.56 2.31 GHz -64.35 9965 GHz -39.33	5 dBm 5 dBm				
		M5 1 2.39	9965 GHZ -39.33	a a m	Measurin	(IIIII) (4	29.05.2019	
		Dam:29MAY 2019 20:47:51						
		MultiView Spectrum					∇	
		Ref Level 20.00 dBm Offset 1. Att 30 dB SWT 1.0 1 Frequency Sweep	10 00 = RB₩ 100 kHz Mode Au	to Sweep			Count 500/500 19k Max	
		10 d8m				M1[1] M2[1]	6.03 dBm 2.4038140 GHz -42.56 dBm	
		0 dBm					2.4000000 GR	
		-10 d8m-						
		-20 dBm-						
		-30 d8m						
CH00		-40 dBm-						
Hopping mode		****			100000		N.	
			<u>AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA</u>	MANAGANANANA	MAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	MMMM	MM	
		-70 dBm-						
		2.31 GHz 2 Marker Table	1001 pts		MHz/		2.405 GHz	
		Type Ref Trc M1 1 2.40 M2 1	X-Value Y-Va 3814 GHz 6.03 2.4 GHz -42.56	alue 8 dBm 5 dBm	Function	Function F	Result	
		Type Perf Trc. X-Value Y-Value Function Function Result M1 1 2.403814 dH 6.03 dBm 1 2.4 GHz -42.56 dBm M2 1 2.4 GHz -59.61 dBm - - - M3 1 2.39 GHz -59.61 dBm -						
			5205 0112 -45101		Messure	(IIII) (A	29.05.2019	
		Date:29MAY 2019 21:18:10	5				,	
		MultiView Ref Level 20.00 dBm Offset 1./ Att 30 dB SWT 1.0	00 dB = RBW 100 kHz				∇	
		Att 30 dB SWT 1.0 Frequency Sweep	12 ms ⊕ VBW 300 kHz Mode Au	to Sweep		M1[1]	Count 500/500 19k Max 7.20 dBm	
		10 dBm					2.4801430 GHz -55.59 dBm	
		D dBm					2.4835000 GHz	
		-10 dBm H1 -12.800 dBm						
		-20 d8m						
		-30 d8nft						
CH78								
No hopping mode		50 dkm \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Man					
		-60 d8m		mour	mannama	put and a second	montentin	
		-70 d8m						
		2.478 GHz	1001 pts	2.2	MHz/		2.5 GHz	
		2 Marker Table <u>Type Ref Trc </u> M1 1 2.48	X-Value Y-Va 0143 GHz 7.20	alue) dBm	Function	Function R	Result	
		M2 1 2 M3 1 M4 1 2.48	X-Value V-Va 0143 GHz 7.20 4835 GHz -55.59 2.5 GHz -62.85 3962 GHz -51.38	d Bm 5 d Bm 8 d Bm				
					Mossurin	(IIIII) (A	29.05.2019	
		Dame:29MAY.2019 20:53:11						

Report No.: CHTEW19060131

		MultiView 🕀 Spectrum					v
		Ref Level 20.00 dBm Offset Att 30 dB SWT I Frequency Sweep	1.00 dB = RBW 100 k 1.02 ms = VBW 300 k	Hz Hz Mode Auto Sweep)		Count 500/500
	[M1[1 M2[1] 7.17 dBm 2.4799890 GHz
		0 dam					
		+1 -12.890 dBm					
CH78 Hopping mode		-30 d8m					
Hopping mode		-50 d8m	w.	nhr	win		hh
		-70 d8m					
	2	M2 1 M3 1	X-Value 479989 GHz 2.4835 GHz 2.5 GHz	7.17 dBm 7.17 dBm -57.08 dBm -57.01 dBm -55.69 dBm	2.2 MHz/	Function	2.5 GHz Result
		M4 1 2	492058 GHz	-55.69 dBm		Associate (1997)	29.05.2019
	- D	M4 1 2	492058 GHz	-55.69 dBm		Necorie (29.05 2019

st Item:	Band edge		Modu	ation t	ype:		1	π/4D	QPSK
		MultiView Spectrum Ref Level 20.00 dBm Offset 1. Att 30 dB SWT 1.0	00 dB = RBW 100 kHz						V
		Att 30 dB SWT 1.0 Frequency Sweep	05 ms ⊕ VBW 300 kHz	Mode Auto Sweep				M1[1]	Count 500/500 1Pk Max 2.61 dBn
		10 dBm						M2[1]	2.4020100 GH
		0 dBm							A
		-10 dBm-							
		-20 dBm							
e 1 1 e e		-30 dBm-							1 1
CH00		-40 dBm-							Mỹ (
No hopping mode		-50 d8m							
		-70 dBm	a second and the second	enerte Marter and the	and the second	hermon	an she we also a she	whiteway	Walant
		2.31 GHz	100	Ints	9.	5 MHz/			2.405 GHz
		2 Marker Table Type Ref Trc	X-Value			Function		Function F	
		M1 1 2.4 M2 1 M3 1	40201 GHz 2.4 GHz 2.39 GHz 2.31 GHz	Y-Value 2.61 dBm -48.15 dBm -63.65 dBm					
		Md 1	2.31 GHz 99965 GHz	-63.65 dBm -64.02 dBm -48.01 dBm					
		Date:29MAY 2019 20:55:45					Measuring	•••••	29105.2019
		MultiView :: Spectrum	00 dB = DBW 100 kH+						V
		Ref Level 20.00 dBm Offset 1. Att 30 dB SWT 1.0 1 Frequency Sweep	00 08 = RBW 100 kHz 05 ms = VBW 300 kHz	Mode Auto Sweep					Count 500/500 1Pk Max
		10 dBm						M1[1] M2[1]	3.69 dBn 2.4029600 GH -49.24 dBn
		0 dBm-							2.4000000 GH
		-10 dBm-							
		-20 dBm-							
		-30 d8m							
CH00		-40 dBm							NG
Hopping mode		Muumund							+/-
		-60 dBm	upper and the start	- Martinet	had the second second	- have been been been been been been been be	utione	n har and a starter	mun
		-70 dBm-							
		2.31 GHz 2 Marker Table	100			5 MHz/		E	2.405 GHz
		Type Ref Trc M1 1 2.4 M2 1	40296 GHz 2.4 GHz	3.69 dBm -49.24 dBm		Function		Function F	Result
		Type Ref Trc V-Value Y-Value Function Function Result M1 2.40296 GHz -6.59 d8m Function Function Result M2 1 2.40 GHz -49.24 d8m Function Function Result M3 1 2.39 GHz -6.21.8 d8m Function Function M4 1 2.31 GHz -51.51 d8m Function Function							
							Measuring		29.05.2019
		MultiView III Spectrum							v
		Ref Level 20.00 dBm Offset 1. Att 30 dB SWT 1.0	00 dB = RBW 100 kHz 02 ms = VBW 300 kHz	Mode Auto Sweep					Count 500/500
		1 Frequency Sweep						M1[1]	2.4799890 GH
		10 d8m						M2[1]	-52.71 dBn 2.4835000 GH
		o dam							
		-10 dBm H1 -14.560 dBm							
		-20 d8m							
CH78		-3# d8m							
No hopping mode		-50 d8m	Na						
			M.						
		-70 d8m	mound	munham	montern	mm	monument	har warden	nennentre
				Lata		0 MUS /			
		2.478 GHz 2 Marker Table Type Ref Trc	100			2 MHz/		Function F	2.5 GHz Result
		M1 1 2.47 M2 1 2	X-Value 79989 GHz .4835 GHz 2.5 GHz 33522 GHz	Y-Value 5.44 dBm -52.71 dBm -62.45 dBm -53.34 dBm				. unouvili	
		M3 1 M4 1 2.48	33522 GHz	-53.34 dBm					
		N N						H	29705527010

Report No.: CHTEW19060131

	Ref Level 2000 dbm Offset 1.00.db PRM 100.db PRM
	MI(1) 5.47 dBm 10 dBm M2(1) 2493000 GH 25.40 dBm 24835000 GH 2.4835000 GH 10 dBm 11 dBm 11 dBm 11 dBm
	112 14333 dtm
CH78	10 dan
Hopping mode	-50 dbm
	2.478 GHz 1001 pts 2.2 MHz/ 2.5 GHz
	2 Marker Table X-Value V-value Function Function Result Type Ref Trc X-Value V-Value Function Function Result M1 1 2.4793898 GHz S-47 d Bm S-47 d Bm S-47 d Bm M2 1 2.4833 GHz -58.78 d Bm S-58.78 d Bm S-58.76 d Bm M4 1 2.483352 G Hz -58.75 d Bm S-58.76 d Bm S-58.76 d Bm
	Date 29MAX 2019 2122.01

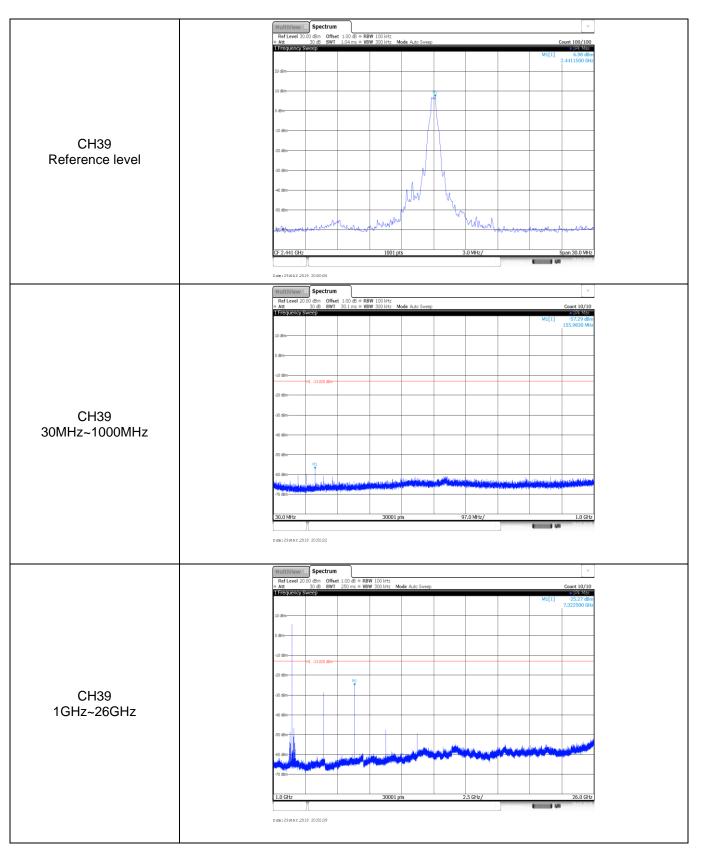
em:	Band edge			Mo	odula	tion	type:		8	BDPS	K
		MultiView	Spectrum								Ψ.
		Ref Level 20. Att 1 Frequency Sv	00 dBm Offset 30 dB SWT	1.00 dB = RB 1.05 ms = VB	WI 100 kHz WI 300 kHz M	ode Auto Sweej	p				Count 500/500 19k Max
										M1[1]	2.75 dBm 2.4021050 GHz
		10 dBm								M2[1]	-48.01 dBm 2.4000000 GHz
		0 dBm-									1 1
		-10 d8m-									
		-20 d8m-	H1 -17.250 dBm								
		-30 d8m									4
CH00		-40 d8m									
opping mode		-50 dBm									*
pping mode		+60 d8m								MR	
		-70 dBm-	and without	in dageke ye die	lannes all show the	mar and a set of the set	and a should	wanted	subserver and	man term	and the second s
		2.31 GHz 2 Marker Table			1001 pt			9.5 MHz/			2.405 GHz
		Type Ref	1 2.	X-Value 402105 GH	z	2.75 dBm		Function		Function F	Result
		M2 M3 M4	1	X-Value 402105 GH 2.4 GH 2.39 GH 2.31 GH 399775 GH	z - z -	Y-Value 2.75 dBm 48.01 dBm 62.55 dBm 62.84 dBm 47.84 dBm					
		M5	1 2.	399775 GH	z -	47.84 dBm				() (A	29.05.2019
		Date:29MAY.201	9 21:01:30								21.01.30
		MultiView									∇
		Ref Level 20. Att 1 Frequency St	00 dBm Offset 30 dB SWT	1.00 dB = RB 1.05 ms = VB	W 100 kHz W 300 kHz M	ode Auto Sweep	p				Count 500/500
		The quality of	weep							M1[1]	3.89 dBm 2.4049530 GHz
		10 dBm								M2[1]	
		0 d8m-									Mid
		-10 d8m-									
		-20 d8m	H1 -16.110 dBm								
		-30 d8m									
CH00		-40 d8m									ľ
ing mode		-50 d8m-									
ing mode		44M	MM	Hum	manand	Munday	Hunty	howhole		M3	
		-70 d8m				4.0001			anter mar	and the party	men.
		2.31 GHz 2 Marker Table			1001 pt			9.5 MHz/			2.405 GHz
		Type Ref M1 M2	1 2.	X-Value 404953 GH	z	Y-Value 3.89 dBm 49.50 dBm		Function		Function R	Result
		M3 M4	1	2.4 GH 2.39 GH 2.31 GH	z - z -	62.71 dBm 50.91 dBm					
		M5	1 2.	399775 GH	z -	48.96 dBm				H	29.05.2019
		Date:29MAY_201	9 21:24:45								
		MultiView									∇
		Ref Level 20. Att 1 Frequency Sy	00 dBm Offset 30 dB SWT	1.00 dB = RB 1.02 ms = VB	100 kHz W 300 kHz M	ode Auto Sweep	p		_		Count 500/500
										M1[1]	5.57 dBm 2.4798130 GHz
		10 dBmM1								-M2[1]	-57.67 dBm 2.4835000 GHz
		0 dām									
		-10 d8m-	H1 -14.440 dBm								
		-20 d8m-									
		-30 d8m	by								
CH78		40 d8m									
ping mode			h								
sing mode		-50 dBm		have the							
		-60 d8m		- Ver	monton	hermon	-enerethano		man	moun	mar hall married
		-70 d8m									
		2.478 GHz			1001 pt	s		2.2 MHz/			2.5 GHz
		2 Marker Table Type Ref	Trc	X-Value				Function		Function R	
		M1 M2	1 2.	X-Value 479813 GH 2.4835 GH 2.5 GH 483962 GH	z -	Y-Value 5.57 dBm 57.67 dBm 62.36 dBm					
		M3 M4	1 2.	2.5 GH 483962 GH	z - z -	55.56 dBm				6	

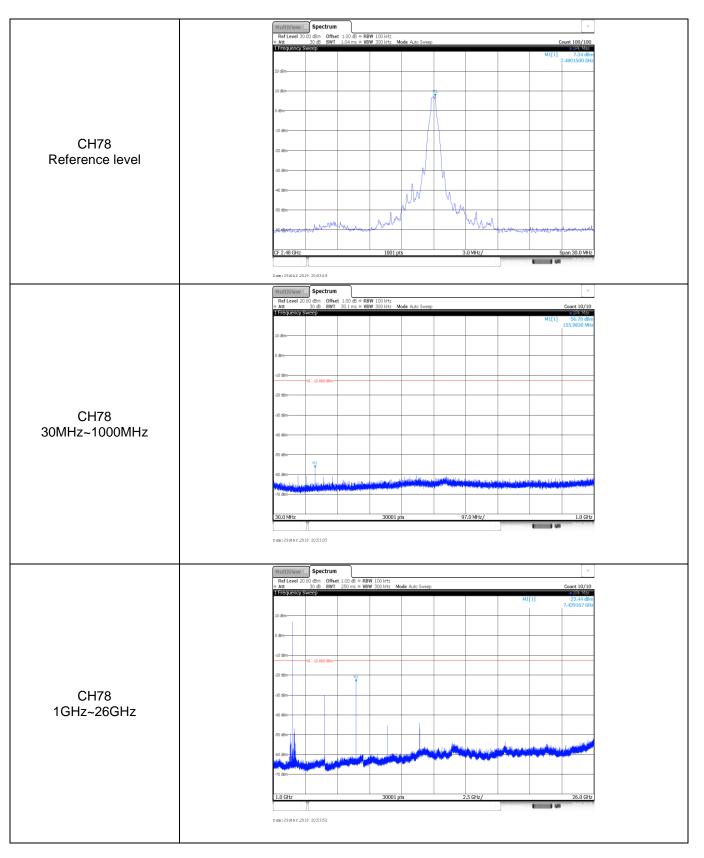
Report No.: CHTEW19060131

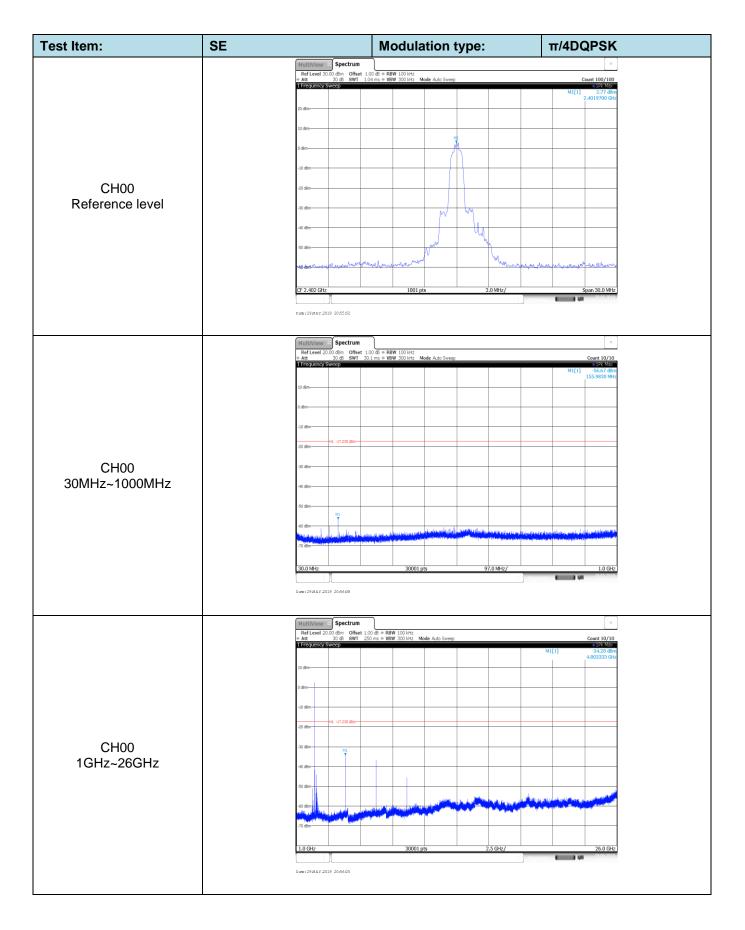
	MultiView Spectrum v Ref Level 2020 dbm Offset 1:00 db = BBW 100 Hz v # Att 30.db SW1 1.02 ms + BWW 300 Hz Count 500/500
	1 Frequency Sweep
	10 don
CH78 Hoppig mode	
	-70 dio 2.478 GHz 1001 pts 2.2 MHz/ 2.5 GHz 2 Morker Table 1001 pts 2.2 MHz/ 2.5 GHz 7 Morker Table 1001 pts 2.3 MHz/ 2.5 GHz 7 Morker Table 1001 pts 2.3 MHz/ 2.5 GHz 7 Mine 1 2.478 GHz 5.39 dBm
	M1 1 2.478143 GHz 5.39 dBm M2 1 2.48355 GHz -57.01 dBm M3 1 2.5 GHz -57.79 dBm M4 1 2.483522 GHz -57.12 dBm M4 1 2.483522 GHz -57.12 dBm

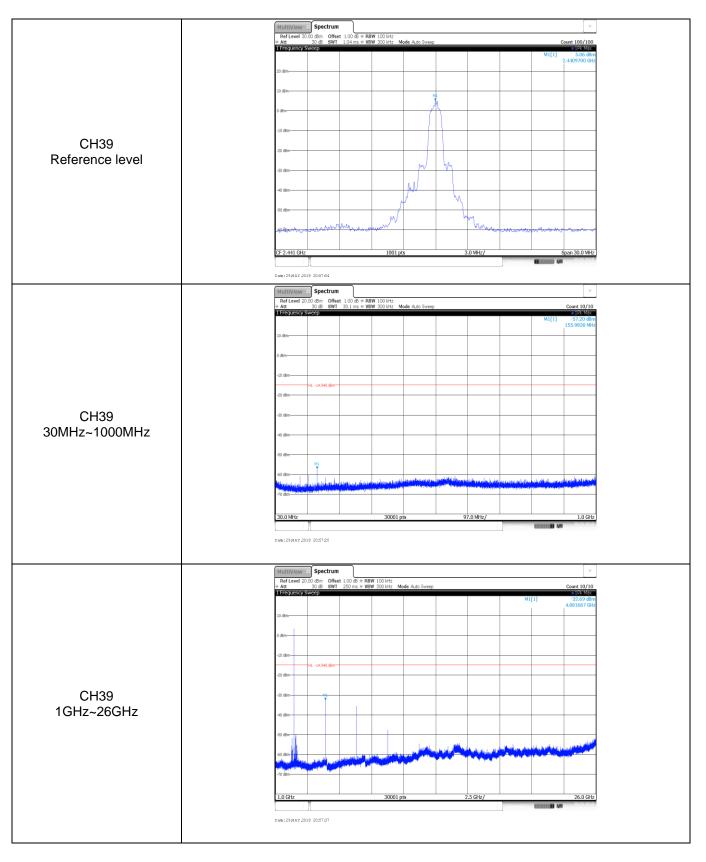
Shenzhen Huatongwei International Inspection Co., Ltd.

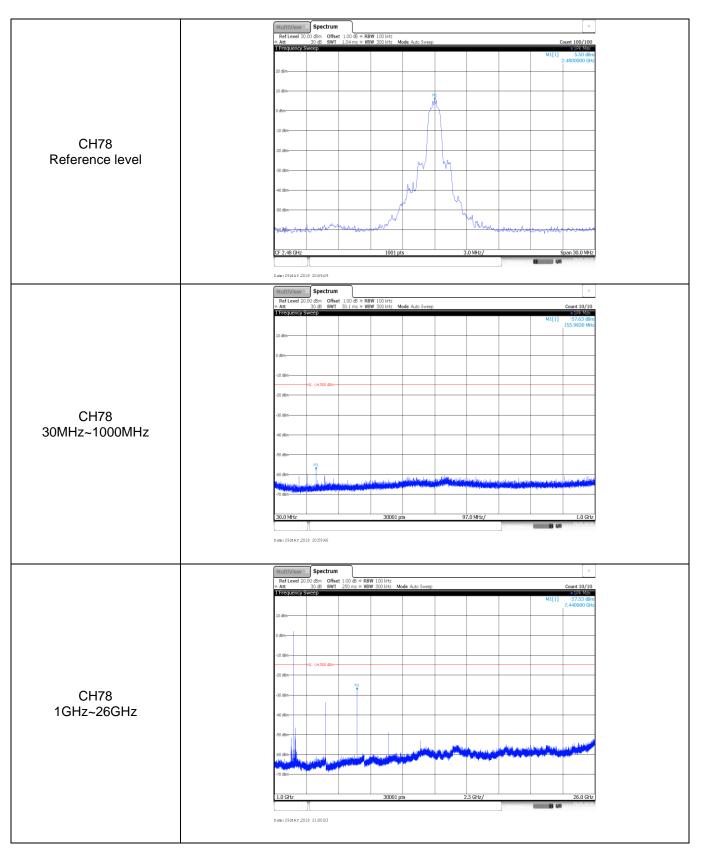
est Item:	SE		Modulation	type:	GFS	۲
		MultiView Spectrum				V
		Ref Level 30.00 dBm Offset 1.0 att 30 dB SWT 1.0 Frequency Sweep	00 dB = RBW 100 kHz 4 ms = VBW 300 kHz Mode Auto Sweep			Count 100/100 1Pk Max
					M1[1]	5.48 dBr 2.4021500 GH
		20 dBm				
		10 d8m		80. 		
		0 d8m				
		-10 dBm				
CH00		-20 d8m-				
Reference level						
		-30 d8m	Ň	May		
		-40 dBm	M/			
		-50 d8m				
		19578th marine Monthly	mundul Mar	~ Munullas	uphrana water and	w.A.w.M.
		CF 2.402 GHz	1001 pts	3.0 MHz/		Span 30.0 MH
					() (
		Data:29MAY 2019 20:47:59				
		MultiView = Spectrum				V
		Ref Level 20.00 dBm Offset 1.0 Att 30 dB SWT 30. 1 Frequency Sweep	00 dB = RBW 100 kHz 1 ms = VBW 300 kHz Mode Auto Sweep			Count 10/10 19k Max
					M1[1]	-56.98 dBr 155.9830 MH
		10 dBm				
		0 d8m-				
		-10 dBm				
		-20 dBm-				
CH00		-30 d8m				
30MHz~1000MHz		-40 d8m-				
		-50 d8m				
		-60 dBm	ing Lolen, tobact teriore lift by diames	delutificated at the second second	ang tin de Balandar, e	ale all colors
		-70 dBm				
		30.0 MHz	30001 pts	97.0 MHz/		1.0 GH
		Date:29MAY 2019 20:48:15			(IIIII) /	29.05.201
		MultiView :: Spectrum Ref Level 20.00 dBm Offset 1.0	0 dB = RBW 100 kHz 0 ms = VBW 300 kHz Mode Auto Sweep			Count 10/10
		Att 30 dB SWT 25 1 Frequency Sweep	s ma = TETT SOUKITZ MODE AUTO SWeep		M1[1]	1Pk Max
		10 dBm				4.804167 GH
		0 d8m				
		-10 dBm				
		H1 -14.520 dBm				
		-20 d8m				
CH00		-30 d8m-				
1GHz~26GHz		-40 d8m				
		-50 d8m				
		-60 d8m		Maria Maria		in the states of the
		المتكافيني الاتفعار يتبعنا المعيطي				
		-70 d8m-				
		1.0 GHz	30001 pts	2.5 GHz/	(IIIII) /	26.0 GH
		Dame:29MAY 2019 20:48:32				20-46-3
	1					

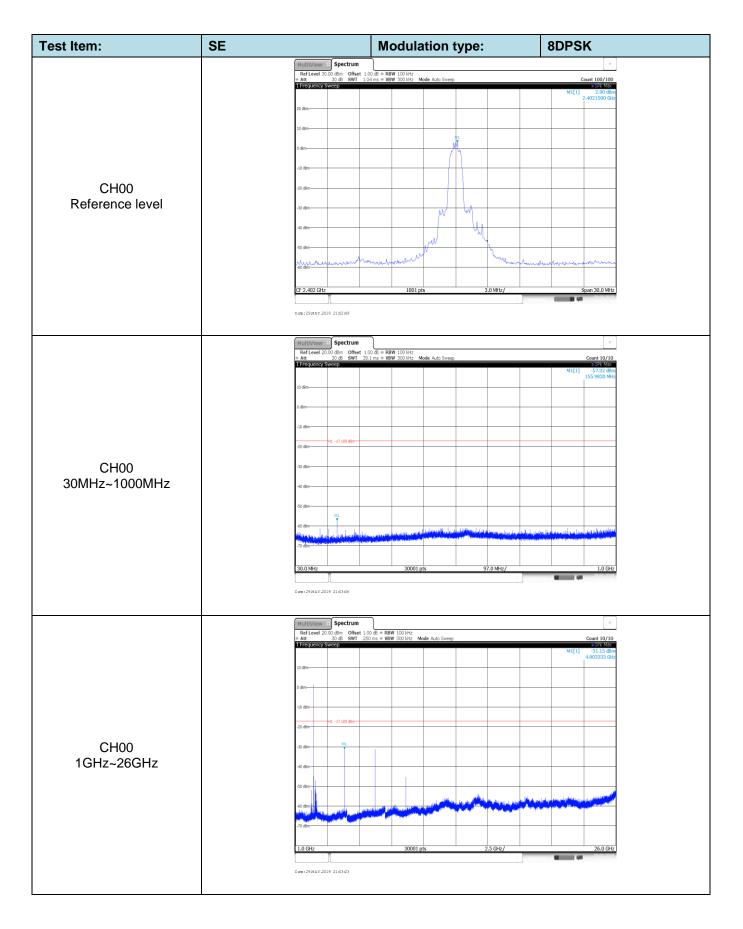


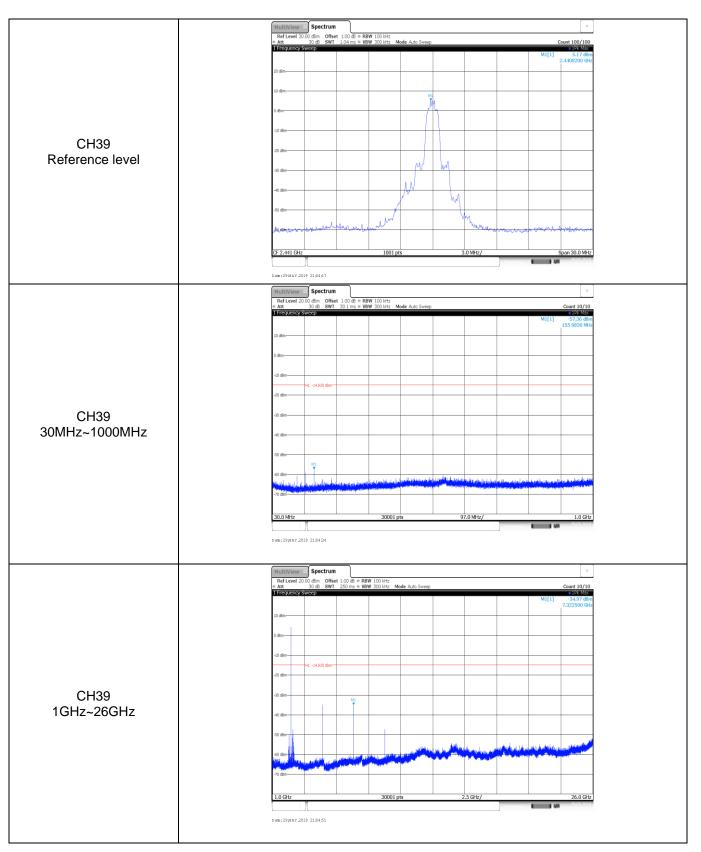


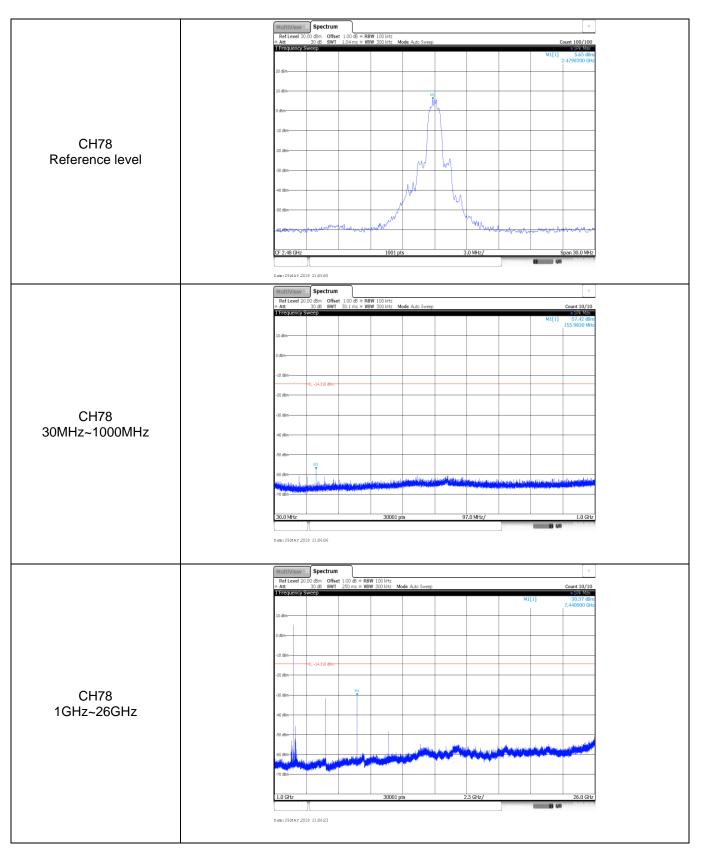












5.11. Spurious Emissions (radiated)

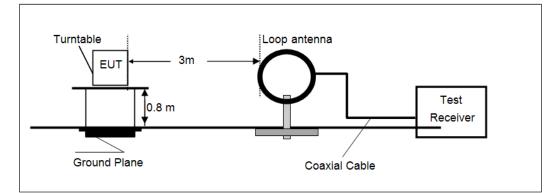
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.209

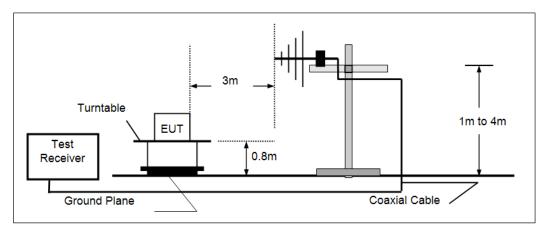
Frequency	Limit (dBuV/m @3m)	Value
30 MHz ~ 88 MHz	40.00	Quasi-peak
88 MHz ~ 216 MHz	43.50	Quasi-peak
216 MHz ~ 960 MHz	46.00	Quasi-peak
960 MHz ~ 1 GHz	54.00	Quasi-peak
Above 1 GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

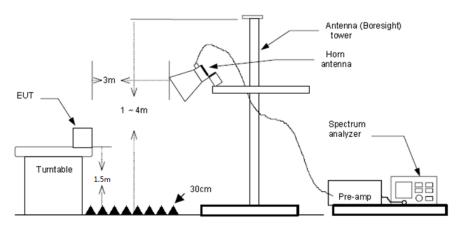
Below 30 MHz



> 30 MHz ~1000 MHz



> Above 1 GHz



TEST PROCEDURE

- 1. The EUT was tested according to ANSI C63.10:2013.
- 2. The EUT is placed on a turn table with 0.8 meter above ground for below 1GHz, 1.5 meter above ground for above 1GHz.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- 6. Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold; If the emission level of the EUT measured by the peak detectoris 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

 (3) From 1 GHz to 10th harmonic: RBW=1 MHz, VBW=3 MHz Peak detector for Peak value RBW=1 MHz, VBW=10 Hz Peak detector for Average value.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

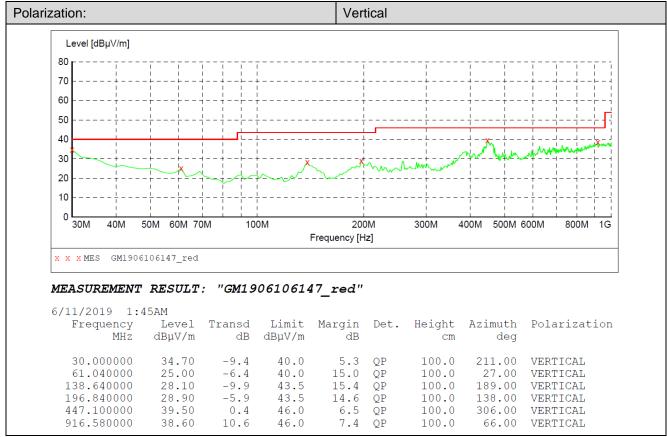
Note:

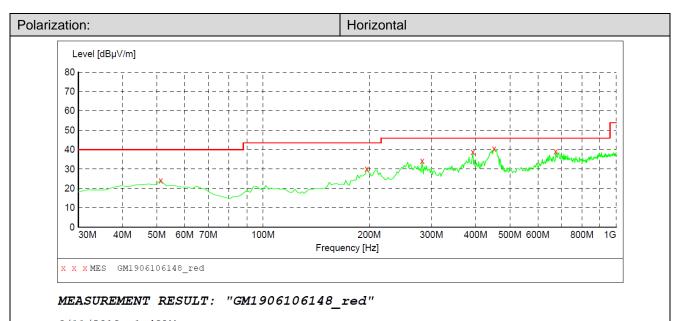
- 1) Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2) The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3) Below 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation High channel which it was worst case, so only the worst case's data on the test report.
- 4) Above 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation which it was worst case, so only the worst case's data on the test report
- 5) The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.

➢ 9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

> 30 MHz ~ 1 GHz





6/11/2019 1: Frequency MHz	48AM Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
51.340000 196.840000 282.200000 392.780000 450.980000 674.080000	24.10 30.10 34.30 38.90 40.50 39.20	-4.9 -5.9 -3.9 -0.8 0.5 5.8	40.0 43.5 46.0 46.0 46.0 46.0	15.9 13.4 11.7 7.1 5.5 6.8	QP QP QP	100.0 100.0 100.0 100.0 100.0 100.0	279.00 218.00 38.00 111.00 65.00 111.00	HORIZONTAL HORIZONTAL HORIZONTAL HORIZONTAL HORIZONTAL HORIZONTAL

➢ 1 GHz ~ 25 GHz

	CH00													
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value					
2832.39	35.34	28.23	8.91	35.80	36.68	74.00	-37.32	Vertical	Peak					
4149.35	34.59	29.95	10.71	37.16	38.09	74.00	-35.91	Vertical	Peak					
4809.50	37.55	31.58	11.74	36.27	44.60	74.00	-29.40	Vertical	Peak					
7209.02	36.77	36.21	14.53	34.74	52.77	74.00	-21.23	Vertical	Peak					
3570.71	35.84	29.21	10.00	37.80	37.25	74.00	-36.75	Horizontal	Peak					
4809.50	37.49	31.58	11.74	36.27	44.54	74.00	-29.46	Horizontal	Peak					
7209.02	35.53	36.21	14.53	34.74	51.53	74.00	-22.47	Horizontal	Peak					
7209.02	21.17	36.21	14.53	34.74	37.17	54.00	-16.83	Horizontal	Peak					

	CH39													
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value					
3176.16	35.93	28.80	9.37	37.56	36.54	74.00	-37.46	Vertical	Peak					
3598.09	35.61	29.29	10.00	37.84	37.06	74.00	-36.94	Vertical	Peak					
5406.96	32.23	31.53	12.49	35.38	40.87	74.00	-33.13	Vertical	Peak					
7319.96	41.52	36.30	14.58	34.77	57.63	74.00	-16.37	Vertical	Peak					
7319.96	24.79	36.30	14.58	34.77	40.90	54.00	-13.10	Vertical	Average					
2839.61	35.55	28.26	8.91	35.97	36.75	74.00	-37.25	Horizontal	Peak					
3534.54	36.30	29.10	9.96	37.79	37.57	74.00	-36.43	Horizontal	Peak					
4883.52	35.00	31.43	11.68	35.97	42.14	74.00	-31.86	Horizontal	Peak					
7319.96	41.38	36.30	14.58	34.77	57.49	74.00	-16.51	Horizontal	Peak					
7319.96	25.12	36.30	14.58	34.77	41.23	54.00	-12.77	Horizontal	Average					

					CH78				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
3893.52	35.15	29.69	10.36	37.42	37.78	74.00	-36.22	Vertical	Peak
4958.68	39.08	31.46	11.81	35.69	46.66	74.00	-27.34	Vertical	Peak
7451.57	39.71	36.20	14.84	34.62	56.13	74.00	-17.87	Vertical	Peak
7451.57	22.61	36.20	14.84	34.62	39.03	54.00	-14.97	Vertical	Average
8484.55	32.47	36.85	15.89	34.27	50.94	74.00	-23.06	Vertical	Peak
3176.16	35.88	28.80	9.37	37.56	36.49	74.00	-37.51	Horizontal	Peak
3672.11	36.08	29.30	9.99	37.88	37.49	74.00	-36.51	Horizontal	Peak
4958.68	39.52	31.46	11.81	35.69	47.10	74.00	-26.90	Horizontal	Peak
7451.57	39.74	36.20	14.84	34.62	56.16	74.00	-17.84	Horizontal	Peak
7451.57	22.72	36.20	14.84	34.62	39.14	54.00	-14.86	Horizontal	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor

2. The emission levels of other frequencies are very lower than the limit and not show in test report.

6. TEST SETUP PHOTOS

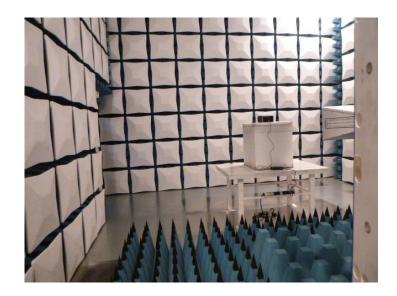
Conducted Emissions (AC Mains)



Radiated Emissions







7. EXTERANAL AND INTERNAL PHOTOS

Reference to the test report No.: CHTEW19060130

-----End of Report------